ATMS SNOWFALL RATE

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Cal/Val Team Members

PI	Team Members	Organization	Roles and Responsibilities
Huan Meng		STAR	Develop project plan, manage project, develop algorithms, conduct cal/val, report progress
	Jun Dong	CICS-MD	Develop snowfall rate algorithm, conduct snowfall rate cal/val
	Cezar Kongoli	CICS-MD	Develop snowfall detection algorithm, conduct snowfall detection cal/val
	Ralph Ferraro	STAR	Provide overall supervision

Algorithm Overview

- The ATMS snowfall rate (SFR) algorithm consists of two components: snowfall detection and rate estimation
  - Snowfall detection (SD): statistical model trained using in-situ observations
  - Snowfall rate: 1DVAR-based physical model; calibrated with Stage IV radar and gauge combined precipitation analyses
- Channels used: 11 ATMS channels from 23.8 to 183±1 GHz, including window, temperature and water vapor sounding channels
- Data
  - Inputs: ATMS TDRs
  - Outputs: SFR, quality flag
  - Ancillary data: GFS

S-NPP/N-20 Product(s) Overview

- S-NPP SFR reaches provisional maturity; NOAA-20 SFR reaches beta maturity
- S-NPP SD Performance Summary (N20 SFR: visual comparisons with S-NPP)
  - Over CONUS

Metrics	L1RDS APU Thresholds	S-NPP Performance	N-20 Performance
Prob of Detection (%)	40 / 50 (obj)	51	
False Alarm Rate (%)	15 / 10 (obj)	8	

  - Over Alaska

Metrics	L1RDS APU Thresholds	S-NPP Performance	N-20 Performance
Prob of Detection (%)	40 / 50 (obj)	46	
False Alarm Rate (%)	15 / 10 (obj)	10	

- S-NPP SFR Performance Summary - CONUS

Metrics	L1RDS APU Thresholds	S-NPP Performance	N-20 Performance
Accuracy (mm/hr)	0.30 / 0.15 (obj)	0.06	
Precision (mm/hr)	1.00 / 0.70 (obj)	0.74	

Major Risks/Issues and Mitigation

- Provide updates for the status of the risks/actions identified

Risk/Issue	Description	Impact	Action/Mitigation
Complication with operational implementation	SFR is produced in MiRS. There might be potential complication caused by adding GFS ingestion to MiRS processing in NDE	Delayed MiRS DAP implementation	- Collaborations among NDE, MiRS team, and the algorithm developers to ensure the proper and timely implementation of the MiRS DAP (including SFR) - MiRS v11.3 has been successfully built, integrated, and tested in NDE Dev as of July 26, 2018 - MiRS v11.3 (including SFR) is scheduled for operational production in Sept/Oct 2018
Quality check flag	SFR quality check is not part of the MiRS quality flags	Quality uncertainty in application	Add SFR 1DVAR convergence status to MiRS quality flags in the next DAP scheduled for Dec 2018
Environmental impact on product quality	SD and SFR performance degrades with certain snowfall such as shallow cloud snowfall and snowfall along southern Alaska coastline	Quality degradation	Conduct focused study on these types of snowfall in the future

Milestones and Deliverables

- FY19 Milestones/Deliverables

Task	Description	Deliverables	Scheduled Date
Maturity	N20 SFR reaches provisional maturity; N20 MiRS/SFR ARR	Sept 2018	Sept 2018
Development	- Train N20 snowfall detection model - Update radiometric bias correction coefficients for N20 SFR	Aug 2018	Aug 2018
Integration & Testing	- Support MiRS N20 SFR integration/testing - Support NDE with N20 SFR implementation	Mar 2019	Mar 2019
Calibration & Validation	- N20 SD and SFR calibration and validation against in-situ, Stage IV, and MRMS data - S-NPP SD and SFR stratified validation	Jul 2019	Jul 2019

Future Plans/Improvements

- Algorithm Improvements
  - Advanced calibration (FY19~20)
  - Improved cloud microphysics (FY20~21)
- J2 and Beyond
  - Algorithm preparation (FY21)
  - Algorithm optimization (FY22)
- Reprocessing Plans/Status
  - SNPP SFR reprocessing (FY20)
  - N20 SFR reprocessing (FY21)
- Long Term Monitoring/Website links
  - ESPC web-based MiRS monitoring will be updated to include SFR
  - CICS: http://cics.umd.edu/sfr/index.php

User Feedback & Summary

- Summary
  - S-NPP ATMS SFR has reached provisional maturity
  - N20 ATMS SFR has reached beta maturity
  - ATMS SFR has been integrated in MiRS v11.3
  - MiRS v11.3 was successfully built, integrated, and tested in NDE Dev; scheduled for operational production in Sept/Oct 2018
  - N20 SFR will reach provisional maturity in FY19
- User Feedback
  - From NCEP CMORPH: The SFR product significantly enhances winter precipitation estimates and substantially expands the utilities of CMORPH2 (global blended precipitation analysis)
  - From assessment at NWS WFOs: The SFR product is useful in weather forecasting and improving forecasters situational awareness, especially in filling radar gaps